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Title page

'The tough get tougher': Mental skills training with elite military recruits.

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Title: 'The tough get tougher': Psychological skills training with elite military recruits.

Mental toughness has been described as one of the most important variables in determining success in high stress environments (e.g., Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015; Jones, Hanton, & Connaughton, 2002), with results from the mental toughness literature supporting the contention that it is important in predicting performance outcomes across various performance contexts (e.g., Arthur, Fitzwater, Hardy, Beattie, & Bell, 2015; Beattie, Alqallaf, & Hardy, 2017; Bell, Hardy, & Beattie, 2013; Gucciardi, Hanton, et al., 2015; Gucciardi, Peeling, Ducker, & Dawson, 2016). Yet there are limited field based interventions that have been specifically designed to impact mental toughness and examine the concomitant effects on performance, especially in military contexts. For exceptions within sport please see Bell et al. (2013) and Gucciardi, Gordon, and Dimmock (2009). Indeed, Gucciardi and colleagues have called for further research is to identify the most effective content and method of delivery for psychological skills interventions aimed at developing mental toughness. To this end the current research is a field based intervention study that utilises objective performance data to examine whether a psychological skills intervention facilitates an increase in mentally tough behaviour.

Despite the resurgence of research into mental toughness over the last 15 years, spawning a plethora of definitions of mental toughness and a variety of tools by which to measure it (e.g., Arthur et al., 2015; Clough, Earl, & Sewell, 2002; Gucciardi, Jackson, Hanton, & Reid, 2015; Hardy et al., 2014; Middleton, Marsh, Martin, Richards, & Perry, 2005; Sheard, Golby, & v. Wersch, 2009), little progress has been made on the agreement of a common conceptualisation and measurement tool (Gucciardi & Gordon, 2011). While mental toughness has generally been regarded as a multidimensional, relatively stable, trait-like construct (e.g., Clough et al., 2002; Gucciardi, Gordon, & Dimmock, 2009; Jones et al, 2002; Clough & Crust, 2005), a collection of recent studies have provided evidence that it may be

appropriate to operationalize it as a unidimensional construct (e.g., Arthur et al., 2015; Hardy, et al., 2014; Gucciardi, Jackson, et al., 2015; Gucciardi et al., 2016). Further, recent research by Gucciardi, Hanton, et al. (2015) suggested that mental toughness may be "a contextualized expression of dispositional traits that are activated or shaped by contextual or social factors" (p. 41). In an attempt to further explore the underlying mechanisms of mental toughness, recent attention has turned to observable behavior. (e.g., Beattie et al., 2017; Bell et al., 2013; Gucciardi, Jackson et al., 2015; Gucciardi et al., 2016). Hardy et al. (2014) argue that while several qualitative studies have shown that mental toughness may be related to a collection of unobservable values, attitudes, emotions, and cognitions (e.g., determination, focus, confidence, perceived control, thriving through challenge, sport awareness, tough attitude, and desire for success) (e.g., Gucciardi & Gordon, 2011; Jones et al., 2002), mentally tough *behavior* is just that, a behavior. Therefore, the presence or absence of mentally tough behavior (e.g., persistence, effort, perseverance) should be determined before claims are made about the importance of unobservable predictors and key correlates (Gucciardi, Jackson et al., 2015; Hardy et al., 2014; Gucciardi et al., 2016). To this end we define mental toughness from a behavioral perspective as "the ability to achieve personal goals in the face of pressure from a wide range of different stressors" (Hardy et al., 2014, p. 5).

Although no common agreement exists on the precise definition of mental toughness, researchers are in agreement that mental toughness is an important construct within performance domains. Moreover, in most contexts where the ability to deal with adversity and challenge is essential to success, mental toughness is commonly regarded as *the* most important attribute that enables an individual to achieve high levels of personal performance (e.g., Jones et al., 2002). Indeed, studies in a variety of achievement contexts have demonstrated the importance of mental toughness. For example, when measured using the Mental Toughness Questionnaire-48 (MTQ-48, Kaiseler, Poleman, & Nicholls (2009) showed

that mental toughness predicted coping and coping effectiveness and to be associated with less stress and more control experienced by athletes. Further, Crust and Clough (2005) demonstrated that mental toughness was significantly positively correlated to an endurance task. In the military context, mental toughness has been shown to significantly predict higher levels of performance over and above that accounted for by individual fitness levels (Arthur et al., 2015) and normative commitment, affective commitment, and recruit adjustment in training (Godlewski & Kline, 2012). Furthermore, Gucciardi, et al. (2015) provided evidence that mental toughness was important for sustaining high levels of performance and success when faced with the stress and adversity of a physically and mentally demanding military task while controlling for hardiness and self-efficacy.

Despite the theoretical advances being made in mental toughness research, Gucciardi, Hanton et al. (2015) argue that certain conceptual and methodological concerns have limited the usefulness of previous studies for the conceptual development of mental toughness. Firstly, the empirical focus on mental toughness has primarily been within sport contexts, which limits the extent to which the construct may generalize to other, non-sport samples. Secondly, when mental toughness *has* been examined in non-sport contexts, researchers have applied sport models without an adequate explanation of the substantive or empirical evidence for doing so (Gucciardi, Hanton, et al., 2015).

A number of researchers have contributed to the discussion regarding the theoretical, empirical, and applied concepts in sport psychology and how they might be applied to current and future military initiatives (e.g., DeWiggins, Hite, & Alston, 2010; Fiore and Salas, 2008, Goodwin, 2008; Gucciardi et al., 2015; Hammermeister, et al., 2010; Janelle & Hatfield, 2008). Indeed, there are many similarities between the performance-related psychological challenges that soldiers and athletes are required to deal with (Janelle & Hatfield, 2008). Both

lack predictability, with a real and perceived cost of winning and losing, and the associated risk of participation impacting the psychological responses that affect performance (DeWiggins et al., 2010). However, one could reasonably argue that the degree of risk and objective magnitude of stressors experienced by combat soldiers is far greater than that of any athlete or team, where terms such as "fighting for one's life," is often a realistic scenario rather than a mere metaphorical descriptor (Janelle & Hatfield, 2008, p. S40). In many cases, this repeated exposure to extreme stress often leads to adverse long-term emotional and behavioral problems (Kok, Herrell, Thomas, & Hodge, 2012), with research showing these effects to be significantly clustered in the cohort of personnel who start out less psychologically robust (LeardMann, C. Smith, T. Smith, Wells, & Ryan, 2009).

Stress and anxiety in the military environment are not, however, limited to the combat context. Problems of stress, coping and adaption are highly relevant in military training, where distractions, anxiety and fear are common challenges experienced by recruits throughout the training period, all of which require a degree of mental fortitude and/or various coping strategies. Unfortunately, these important psychological competencies are, at best, implicit, with recruits having to rely on their own cognitive functioning and coping strategies to control thoughts, emotions, and behavior. Consequently, while many recruits learn these vital mental lessons over time, the remainder will have varying degrees of difficulty acquiring these skills (Thompson & McCreary, 2006). It is, therefore, logical to presume that the variety of applied concepts in sport psychology, deemed so critical to high-level performance in sports (i.e., mental toughness, psychological skills), could be utilized in military training to enhance performance and facilitate coping in stressful situations (DeWiggins et al., 2010; Fiore & Salas, 2008, Goodwin, 2008; Hammermeister, et al., 2010; Janelle & Hatfield, 2008). In particular, elite military training and selection, which subjects potential candidates to far more extreme physical and psychological demands in comparison to regular army units

(Sundin, Jones, Greenberg, Rona, Hotopf, Wessley, & Fear, 2010) may benefit from performance enhancing concepts from the sport domain.

While the aforementioned research has only provided correlational evidence that mental toughness is related to performance outcomes in the military, there is a dearth of intervention research and thus there is as yet no evidence to suggest that mental toughness can be developed within a military context. Furthermore, no intervention evidence exists that increasing levels of mental toughness will have concomitant effects on performance. Therefore, in light of the environmental stresses experienced by servicemen and women, along with the potential emotional and behavioral problems, the next logical step would be to explore the possibility of developing mental toughness in military personnel through targeted interventions. The current research utilised a field based intervention design to examine the development of mental toughness in a high performance military training context.

The United States military has already acknowledged the potential value of theoretical, empirical, and applied concepts from sport psychology. In an effort to increase the psychological strength and positive performance of its service personnel, and reduce the high incidence of maladaptive responses of combat-related stress disorders, the U.S Army has established the comprehensive soldier fitness (CSF) program and the mental resilience trainer (MRT) course as a means of delivery. CSF is an integrated, proactive approach to increasing resilience and enabling mental toughness in soldiers, their families, and the civilian workforce. Personnel are taught a variety of performance enhancing psychological and physical skills to be employed when facing a the wide variety of challenges they may be required to face in their personal and professional lives, including combat (see Reivich, Seligman, & McBride, 2011 for a review). The MRT course is one of the foundational pillars of comprehensive soldier fitness and provides instruction to low-level unit leaders on how to teach the resilience and mental toughness enabling skills to their soldiers (see Cornum,

Mathews, & Seligman, 2011 for a review). Furthermore, psychological skills training (PST) has been integrated into elite U.S. Special Forces training and selection to facilitate the development of mental toughness. During the U.S. Navy SEAL Basic Underwater Demolition/Seals program, potential candidates receive training in a variety of psychological skills and cognitive strategies that are integrated throughout the SEAL selection program. (e.g., Robson & Manacapilli, 2014). Unfortunately, however, no empirical evidence exists to suggest that this develops mental toughness or resilience in SEAL candidates.

Several decades of research in the sport domain has generated a wealth of evidence demonstrating the positive effect of psychological skills usage in relation to performance (e.g., Cumming & Ramsey, 2010; Hanton, Mellalieu & Hall, 2004; Kress & Statler, 2007; Patrick & Hrycaiko, 1998; Sheard & Golby, 2006; Thelwell et al., 2001). However, only in the past decade have there been attempts in sport to enhance mental toughness via PST interventions in sport (e.g., Bell et al., 2013; Gucciardi et al., 2009), therefore, it would seem prudent to adopt a PST perspective within a military context. This is surprising, considering that many of the factors associated with mental toughness (e.g., Connaughton, Hanton, & Jones, 2010; Jones et al., 2002) have been shown to be associated with psychological skills (e.g., confidence, emotional control, visualisation motivation, positive energy, commitment, thrive through challenge, etc.) (Beattie et al., 2017). While no attempt has been made to conduct PST intervention studies to facilitate the development of mental toughness in the military, there have been recent PST studies aimed at enhancing performance, with the initial results being widely supportive of the benefits of psychological skills (e.g., Adler, Bliese, Pickering et al., 2015; R. Arthur, Fitzwater, Roberts, Hardy, & C. Arthur, 2017; Hammermeister et al., 2010).

For example, Adler and colleagues examined the effect of a psychological skills intervention with a sample of soldiers in basic combat training. Results revealed that soldiers

using a variety of task-related psychological skills (including goal-setting, relaxation techniques, self-talk and mental rehearsal) performed significantly better on a variety of military tasks (including fitness related tasks), compared to those in an active control condition. Hammermeister and colleagues examined soldier's use of psychological skills in three psychological skills profile groups (i.e., strong skills, weak skills, and fearful focus). Results revealed that soldiers in the strong psychological skill profile group performed significantly better than those in the other profile groups on an army physical fitness assessment. More recently, R. Arthur and colleagues examined the indirect effects of basic psychological skills (i.e., goal-setting, relaxation, self-talk, & imagery/mental rehearsal) on military endurance through enhanced advanced psychological skills. While controlling for fitness as a covariate, their results revealed that goal-setting, imagery and relaxation all had positive indirect effects on endurance via activation, with goal setting also impacting on endurance via negative thinking. This provides further support for the use of basic psychological skills for enhancing performance in a military context.

Unfortunately, no attempt was made to measure mental toughness in any of these studies, thus the role of PST in developing mental toughness and the concomitant effects on performance remains untested. This is unfortunate, as the military training environment is replete with opportunities for the recruits to demonstrate mentally tough behavior. Consequently, the current study aims to extend the work these studies by examining the potential impact of a psychological skills intervention on the development of mental toughness in an elite military training setting towards the end of the training period. A secondary aim is to examine the impact of the intervention on performance.

While individual talent (including physical fitness) is an important variable in performance achievement, it is not uncommon for talented individuals with exceptional physical attributes to fail to perform to their full potential. Indeed, it is recognized that

psychological factors are just as important in determining athletic performance, with mental toughness being acknowledged one of *the* most important attributes in achieving performance excellence, particularly in contexts where the ability to deal with adversity and challenge is essential to success (Gucciardi et al., 2008; Jones et al., 2002). Furthermore, previous research in both elite and regular military training environments have shown transformational leadership to positively impact on a number of performance-related outcome variables (e.g., resilience, confidence, training satisfaction, group cohesion) and discriminate between recruits' success and failure in training (Arthur & Hardy, 2014; Hardy et al., 2010). Consequently, the current research controlled for leadership and physical fitness.

The current study used a quasi-experimental trial with experimental (PST) and control conditions to examine the impact of a psychological skills intervention on observer-rated mental toughness and performance on an arduous military selection course. The psychological skills intervention targeted the four basic psychological skills of goal-setting, relaxation and arousal regulation, self-talk strategies and imagery/mental rehearsal, based on their previously demonstrated efficacy with respect to performance enhancement in competitive sport and military contexts (e.g., Arthur, et al., 2015; Kress & Statler, 2003; Patrick & Hryaiko, 1998; Sheard & Golby, 2006; Thelwell et al., 2001). P-Company provided all participants with the same opportunity to demonstrate mentally tough behavior under pressure, with prior individual fitness and the recruits' leadership climate being isolated as covariates. In this way the current research addresses the potential impact on the recruits' performance by the previously mentioned extraneous variables. We hypothesize that: (a) PST will result in an increased use of psychological skills during training resulting in, (b) greater use of psychological skills use by recruits during an arduous physical selection course and, (c) greater use of psychological skills will result in higher levels of mental toughness with concomitant effects on performance.

Method

Participants

Data was collected from 222 male British Army Para recruits, aged between 17 and 33 (M_{age} = 21.13, *SD* 3.36) and 32 Parachute Regiment corporals (M_{age} = 28.44, *SD* 2.74) from a UK-based infantry training establishment. At the start of the study, the recruits were at week 16 of basic training, having had no previous military experience, while the corporals were part way through a 24-month instructional tour of duty (*M* = 12.80 months, *SD* = 6.51 months) and had served between 7 and 18 years in the Parachute Regiment (*M* = 9.78 years, *SD* = 1.90 years).

Para Training and Selection

Para basic training is a 28-week course, widely regarded by the British Army as being the most physically and mentally demanding of all infantry regiments in the British Armed Forces (Wilkinson, Rayson, & Bilzon, 2008). It is designed to produce physically and mentally robust soldiers able to deal with the physical and mental demands placed on soldiers in combat. Due to the highly attritional nature of Para basic training, platoon sizes can decrease by up to 60% before completion (Wilkinson et al., 2008). Failure to complete the course is attributable to a variety of reasons, including injury, poor performance, or voluntary discharge.

At week 20 of the course, Para recruits are required to undergo Pre-Para Selection, more colloquially known as P-Company. The purpose of P-Company is to test physical fitness, determination and mental robustness, under conditions of stress, to determine a recruit's suitability for service in the Parachute Regiment. Although a high level of fitness is required to successfully complete P-Company, the various tests are also designed to assess a recruit's ability to maintain a high level of performance under pressure. Failure results in the unsuccessful recruits being reallocated to a platoon earlier in the training cycle or transfer to

another infantry regiment. P-Company consists of a series of physically demanding team and individual events that involve carrying personal equipment weighing 20kg or more for distances of up to 32km over severe terrain with time constraints, a steeplechase assault course, and an aerial confidence course. Two team events require the participants to run with a 60kg log and 80kg stretcher for 2.5km and 8km respectively. P-Company pass rates typically range between ~40-70%.

Statistical Power

Statistical power for the current study was estimated using G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007) using the generally accepted criteria of .80 or above to detect an effect (Cohen, 1988). The G*Power analysis revealed that a power of .80 would be achieved with a sample size of between 28 and 237, depending on the analysis (i.e., mixed model MANOVA, $N = 237$; 1-way MANOVA, $N = 86$; mixed model ANOVA, $N = 28$; ANCOVA, $N = 128$).

Study Design

A random block experimental design was implemented to evaluate the efficacy of the intervention. While completely random allocation of participants is preferred, this was not feasible at the recruit level in the present study because it would have meant delivering the PST to some recruits in each platoon and not others. This was not possible because the structure of training precluded this. Furthermore, this design would likely compromise the integrity of the groups, as cross contamination would be highly possible. When random assignment is not possible, Grant and Wall (2009) suggest a quasi-experimental design to be appropriate. Quasi-experimental designs have distinct advantages in that they can serve to strengthen causal inferences, minimize ethical dilemmas and inequity, and help the researcher to take advantage of the effect of un-controllable environmental events.

Data were gathered at 2 time points, 3 weeks (22 days) apart. The first platoon was assigned to the control condition, the second to the experimental, and so on for a total of 10 platoons (five in each condition). By the later stages of training, a typical Para platoon consists of, not only those remaining of the original intake, but also those returning from injury and rehabilitation, those who have failed an earlier P-Company or stage of training and transferees from other regiments. Consequently, some control recruits had already been exposed to some form of coping skills training by the first author, while others who had transferred would have already completed basic training with their own regiments. Therefore, in order to avoid any influence from recruits previously exposed to PST or other confounding variables, the inclusion criteria for the study was that only original entrants in each platoon were eligible to participate. Thus, questionnaires were only administered to, and data collected from, recruits who had started with the original intake of each platoon and had completed 16 weeks of training at the start of the study. Of the 222 recruits from whom initial data were collected, 83.8% (n = 186) completed P-Company and, therefore, were retained for analysis ($n_{control}$ = 92; M_{age} = 20.96, *SD* 3.54; $n_{experimental}$ = 94; M_{age} = 21.14, *SD* 3.20). The remainder were either: (1) not loaded onto P-Company due to injury (13.9%, $n_{control}$ = 16, $n_{experimental}$ = 4) or being back-termed to a previous platoon (9.7%, $n_{control}$ = 7, $n_{experimental}$ = 4); (2) withdrawn during P-Company due to injury (7%, $n_{control}$ = 6, $n_{experimental}$ = 2); or (3) withdrawn from P-Company due to failure to complete the aerial assault course (0.8%, $n_{control}$ = 1, $n_{experimental}$ = 1). The aerial assault course is the second event of P-Company and is a pass or fail test with no points allocated. Failure to successfully complete this test results in withdrawal from P-Company.

Instruments

Military Training Mental Toughness Inventory. The Military Training Mental Toughness Inventory (MTMTI; Arthur, et al., 2015) is a six-item informant rated behavioral

measure of mental toughness designed to assess recruits' ability to maintain optimal performance under pressure from a range of different stressors experienced during infantry basic training. Responses are based on how well each recruit is able to maintain a high level of personal performance when confronted with different stressful situations in training (e.g., when the conditions are difficult; when he has been reprimanded or punished). Responses are based on a 7-point Likert scale ranging from 1 (never) to 7 (always), with a midpoint anchor of 4 (sometimes). The MTMTI has been found to possess sound psychometric properties and structural validity as well as good test-retest reliability, concurrent validity, and predicted performance in two different training contexts with two separate samples, including a sample of Para recruits (Arthur et al., 2015). The composite reliability for the scale was .93, with standardized factor loadings ranging from .76 to .97.

Test of Performance Strategies. The Test of Performance Strategies (TOPS-2; Hardy, Roberts, Thomas, & Murphy, 2010) is a 36-item instrument designed to measure a range of basic and advanced psychological skills and techniques used by athletes in both practice and competition. Specifically, the instrument measures the quantity of use rather than the quality of use (i.e., how much one uses the skills/techniques, rather than how good or effective one is at implementing them). A previously contextually modified version of the TOPS-2, which was shown to demonstrate good psychometric properties with a similar sample population (Arthur et al., 2017), was used to assess recruits' use of psychological skills in training (i.e., pre and post-intervention) and during P-Company. In the current research we only used the four basic psychological skills subscales that assess the extent to which recruits make use of psychological skills. Example items included; "I set realistic but challenging goals for practice" (goal-setting), "I use relaxation techniques as a coping strategy during P-Company" (relaxation), "I say things to myself to help my practice performance" (self-talk) and, "I rehearse my performance in my mind before practice" (imagery). The composite reliability

for the practice scale was .97, with standardized factor loadings ranging from .76 to .97. The composite reliability of the competition scale was .95, with standardized factor loadings ranging from .45 to .94. Only four were below .70, one in each subscale.

Transformational Leadership Inventory. A modified version of the Differentiated Transformational Leadership Inventory (e.g., DTLI; Hardy, Arthur, Jones et al., 2010) was used to measure and control for leadership climate within each group. The DTLI has 22-items that measure the following 6 transformational leadership behaviors: (a) appropriate role modeling (e.g., "my section corporal always leads by example"); (b) inspirational motivation (e.g., "……. sets high standards for me to achieve"); (c) fostering acceptance of group goals (e.g., "…….. always encourages us to be team players"); (d) individual consideration (e.g., "……..spends time teaching and coaching me"); (e) intellectual stimulation (e.g., …..encourages me to think for myself"); and (f) high performance expectations (e.g., "……always emphasizes trying your best"). Responses were made on a 5-point Likert scale anchored by 1 (not a tall), 2 (not very often), 3 (sometimes), 4 (fairly often) and 5 (all of the time). The purpose of measuring transformational leadership in the current study was simply to control for the effects of transformational leadership. Consequently, it was decided to form a composite transformational leadership scale by using one item from each subscale. This procedure has been used in other research on transformational leadership where a composite reduced item scale has been used (e.g., Barling, Loughlin and Kelloway, 2002). Individual items were selected based on those we considered most representative of the sub-scale. The items selected are those provided as example items above. The composite reliability for the composite leadership scale was .87, with standardized factor loadings ranging from .64 to .78.

Performance. During P-Company, recruits can achieve a maximum of 70 points, determined by their performance on each event (i.e., up to 10 points for each of the 7 events; the aerial confidence course is a pass or fail test). Most of the points are awarded objectively

based on time to complete or completion of an event and are awarded by P-Company staff, who are independent of the recruits' regular training team. Performance scores during the present study ranged from 10-70 out of a maximum possible score of 70 points (M = 55.53, SD = 11.01), which is within the normal range for P-Company.

Fitness. An objective measure of fitness was used to control for individual fitness. At week 16, recruits are required to complete two contextually relevant, timed physical assessments to measure progression in individual fitness. One of these assessments is a two-mile loaded run, carrying a 16 kg pack and 4kg rifle, with the other being the negotiation of a steeplechase assault course consisting of several dry and water obstacles. The two-mile loaded run times ranged from 15min, 4s to 25min, 3s (M = 18min, 31s, SD = 1min, 51s), while the steeplechase times ranged from 17m:16s to 29 min, 28s (M = 20m:50s, SD = 1m:42s). In order to create an overall indication of individual fitness prior to the delivery of the intervention, the times were standardized for each event and were then combined to create an overall score. The overall score was then multiplied by -1 (so that a higher score was indicative of better performance).

Procedure

Following institutional ethical approval, at week 16 of training, the recruits and instructors were informed of the nature of the study and asked if they would participate. Those agreeing to participate were given standardized verbal instructions regarding the completion of the initial questionnaires, including social-desirability instructions which encouraged participants to respond honestly at all times. All participants were also informed that the data provided would be held in confidence and not shared with any third party (e.g., their instructors, PPS staff) and that they were free to withdraw from the study at any time.

The TOPS-2 (practice) and DTLI were both administered to recruits in week 16 prior to the intervention being delivered (T1), and at the beginning of week 20, two days prior to the

start of P-Company (T2), and by which time the intervention had been completed. The TOPS-2 (competition) was administered to the recruits with a retrospective instructional set within one hour of completing the final P-Company event and before they had been informed of the results. The recruit questionnaires were administered in a large recreation room by the first author with no other military staff present. The MTMTI were administered at weeks 16 and 20 in the instructors' rest room. Fitness data were collected at weeks 16 and 19 and P-Company performance data were obtained on completion of P-Company from the official P-Company scorecard.

Intervention

The experimental group was exposed to a psychological skills program targeting goal-setting, relaxation and arousal regulation, self-talk strategies and imagery/mental rehearsal. The intervention was developed and administered by the first author (a former warrant officer in the Parachute Regiment, and a performance psychology doctoral student under the guidance of two scientists with doctoral-level sport psychology expertise) following general guidelines recommended by Weinberg and Williams (2010). The intervention consisted of a total of 520 minutes of interaction with the first author, split into two 80 minute and seven 40 minute sessions between the start of week 17 and the end of week 19. All of the sessions were classroom based, with the exception of one outdoor practical session. After consultation with the organizational hierarchy and training staff, the training sessions were integrated into the platoon's training schedule where they would cause minimum disruption to the training program.

Intervention Procedure

After an initial introductory and administrative session, the first skill session involved the recruits being educated in the use of progressive muscle relaxation (Hardy et al., 1996;

Williams, 2011) and a simple breathing exercise (rhythmic breathing; Williams, 2010) to modify their arousal levels prior to, and during P-Company events. During the second skills session, goal-setting and the use of effective goal-setting strategies were taught, with recruits being encouraged to identify personal outcome, performance and process goals (e.g., complete 10 miler, score more than 50 points on P-Company, regulate breathing and relax during the log race). Having been previously encouraged to identify negative self-talk statements during PT sessions, the third skills session involved educating the recruits in techniques for controlling personal self-talk dialogues, including, thought-stopping, reframing and countering. Examples from the recruits' own experiences were discussed and how they could be changed to a positive valence. The fourth skills session involved recruits being educated in imagery use. An imagery exercise was conducted during which they were encouraged to incorporate all their senses into the experience. It was also explained to them how to conduct mental rehearsal utilizing the other three skills. Sessions were highly interactive and during each session, the potential utility of each skill, before and during P-Company events, was discussed. The recruits were also encouraged to practice each skill during their scheduled physical training sessions. Once taught the four basic skills, a practical psychological skills session was conducted to provide the recruits with opportunity to practice the skills under supervision on a simulated P-Company event (i.e., the log race). This event was chosen as, administratively and time-wise, it had no disruptive effect on the recruits' training. It is also perceived to be one of the hardest P-Company events, involving many aspects of fitness (i.e., endurance, strength, stamina) as well as the ability to tolerate athletic pain (i.e., a great degree of physical discomfort). As each skill was taught, the recruits were encouraged to practice them during their scheduled physical training events, so that they could be reviewed and discussed in subsequent sessions. Details of the content of each session of the intervention can be obtained from the first author.

Comparison Control Group

The control group was not exposed to any form of PST, while both groups experienced the same training regimen throughout the course. The only contact by the research team with the control condition was by the first author, which was solely for the administration of questionnaires. Participants were not informed of the study hypotheses.

Analytic Strategy

The aim of the analysis was fourfold; (1) to determine whether Para recruits' use of psychological skills was greater in training after receiving a PST program, (2) to examine whether there were any differences between the two groups in the recruits' use of psychological skills during P-Company (i.e., "competition"), (3) to examine whether there was a significant increase in mentally tough behavior in the experimental group as a result of receiving a PST program and, (4) to identify whether there was any significant differences in individual performance between groups during P-Company. The primary data analysis was conducted using IBM SPSS Statistics for Macintosh, Version 22.0 (IBM Corp, 2013).

Descriptive data for study outcome variables and covariates are displayed in Table 1. Four analyses were conducted: (1) With the four basic psychological skills entered as the dependent variables, a 2 (Group) x 2 (Time) mixed model MANOVA was conducted to examine the effect of the PST program on psychological skills usage during training (i.e., practice); (2) With the four basic psychological skills entered as the dependent variables, a one-way MANOVA was conducted to determine group differences in psychological skills usage during P-Company test week (competition); (3) A 2 (Group) x 2 (Time) mixed model ANOVA was conducted to determine whether there were significant changes in instructor-rated mental toughness between the two conditions between pre- and post-intervention with mental toughness as the dependent variable; and (4) With the individual P-Company scores of

the recruits entered as the dependent variable and individual fitness rating and the composite transformational leadership scale at week 16 entered as covariates a one-way ANCOVA was conducted to examine the difference in individual performance between groups on P-Company. Finally, a Chi square analysis was conducted to determine any significant difference in pass rates between the groups.

Results

Preliminary Data Testing

MANOVA is known to be extremely sensitive to outliers, which may produce either a Type I, or Type II error with no indication as to which has been committed (Tabachnick & Fidell, 2013). Consequently, preliminary testing revealed 13 univariate outliers which were subsequently removed prior to further analyses, thereby reducing *N* from 186 to 173 (M_{age} = 21.03, *SD* 3.34 ($n_{control}$ = 90; M_{age} = 21.07, *SD* 3.20; $n_{experimental}$ = 83; M_{age} = 21.00, *SD* 3.51). However, while there is no unequivocal procedure for dealing with outliers, in the interests of transparency, the results for all analyses with the outliers retained can be viewed in the supplementary material.

All other assumptions were met, with the exception of Box's M statistic revealed a violation in the assumption of variance-covariance matrices for the psychological skills variables (p = < 001) and Levene's test, which demonstrated a violation in homogeneity of variance for some of the psychological skills (p = < .05). However, Box's M test is known to be over sensitive with large and relatively equal group sizes and that MANOVA is robust enough to deal with this violation (Tabachnick & Fidell, 2013), therefore, a manual scan of the SPSS output was conducted which revealed satisfactory QQ plots. Moreover, in line with recommendations by Tabachnick and Fidell (2013), a more conservative alpha level of .025 was set in order to avoid the possibility of a Type 1 error. Independent sample *t*-tests were conducted to determine any differences in leadership climate (composite transformational

leadership score) and individual fitness levels. While there were no significant differences in leadership climate at week 16 ($t(166)$ = .105, p = > .05), mean fitness in the experimental group was significantly higher than in the control group at week 16 ($t(166)$ = -4.84, p = < .01). Individual fitness and the composite transformational leadership scores were treated as a covariates when analysing P-Company performance.

Attrition bias analyses were conducted to determine any differences between participants who completed P-Company ($n_{complete}$ = 173) and those who did not ($n_{non\text{-}complete}$ = 36). The results revealed no significant differences between the groups for any of the study variables: (a) psychological skills (F(4,195) = 2.34, p = >.05); (b) mental Toughness (t(198) = 1.64, p = >.05); (c) individual fitness (t(194) = .689, p = >.05); (d) composite leadership: ($t(200)$ = .744, p = >.05).

Main Data Analysis

Psychological skills during training. A 2 (group) x 2 (time) mixed model MANOVA revealed a significant group x time interaction (F(4, 168) = 10.56, p = < . 01, η^2_p = .20). Univariate follow up tests revealed significant group x time interactions in the use of goal-setting (F(1, 171 = 17.50, p = < . 01, η^2_p = .09), relaxation (F(1, 171) = 25.38, p = < . 01, η^2_p = .13), self-talk (F(1, 171) = 16.02, p = < .01, η^2_p = .09), and imagery (F(1, 171) = 5.14, p = < .02, η^2_p = .03).

Eight Bonferroni corrected paired sample t-tests (.05/8 = .006) revealed that goal-setting ($t(89)$ = -.83, p = > .05), relaxation ($t(89)$ = .74, p = > .05), self-talk ($t(89)$ = -.63, p = > .05), and imagery (t(89) = -.89, p = > .05) in the control group did not differ from pre-test to post-test, while significant differences were evidenced in the scores for goal-setting ($t(82)$ = -6.53, p = < . 001), relaxation ($t(82)$ = -5.90, p = < . 001), self-talk ($t(82)$ = -4.63, p = < . 001), and imagery ($t(82)$ = -3.94, p = < . 001) in the experimental group. This indicates that the interactions were likely caused by an increase in the use of all four psychological skills during

training by the experimental group between pre and post-test, while no differences were evidenced in the control group.

Psychological skills during P-Company. A one-way MANOVA revealed a significant multivariate effect for group in the use of psychological skills during P-Company (F (4, 168) = 3.55, p = < .01, η^2_p = .08). Univariate follow-up tests revealed significant group effects in the use of relaxation (F (1, 171) = 12.59, p = < .01, η^2_p = .07) and imagery (F (1, 171) = 4.85, p = < .05, η^2_p = .03), while no main effect was observed with goal-setting (F (1, 171) = 2.77, p = > .05, η^2_p = .02) and self-talk (F (1, 171) = 2.88, p = > .05, η^2_p = .02). Examination of the cell means indicated that all these effects were due to the experimental group making more use of psychological skills during P-Company than the control group.

Mental Toughness. A 2 (group) x 2 (time) mixed-model ANOVA revealed a significant group x time interaction (F (1, 171) = 5.30, p = < .05, η^2_p = .03).

Four Bonferroni corrected paired sample *t*-tests (.05/4 = .0125) revealed that mental toughness scores for the control group (t(89) = 1.08, p = > .05) and the experimental group (t(82) = -2.11, p = .038) did not differ from pre-test to post-test.

An independent sample *t*-test revealed no significant difference between the two groups at pretest (t(171) = -1.25, p = > .05) and a significant difference at post-test (t(171) = -3.16, p = < .01), indicating that the interaction was caused by an increase in mental toughness in the experimental group between pre and posttest, with no change having occurred in the control group.

P-Company Performance. A one-way ANCOVA, with individual fitness prior to P-Company and leadership climate entered as covariates, revealed that individual performance on P-Company was significantly higher in the experimental group than the control group (F (1, 172) = 5.93, p = < .05, η^2_p = .03). Although there was a difference of 4.8% in pass P-

Company rates (Exp = 91.6%; Cont = 85.6%), a Chi squared test indicated that this was non-significant ($\chi^2(1) = .11$, $p = > .05$).

Discussion

The purpose of this study was to examine whether a PST intervention would facilitate the development of mental toughness, thereby, enhancing the performance of elite British Army recruits undergoing a physically and mentally demanding infantry regiment selection course. We hypothesized that basic psychological skills usage in the experimental group would significantly increase during training and during a week-long physically and mentally demanding selection course (i.e., P-Company) with concomitant effects observed in informant rated mental toughness and performance when compared to the control group. Importantly, the current study examined the relationships whilst controlling for fitness and leadership climate. This is first study to have examined such effects using an informant-rated measure of mental toughness along with an objective measure of performance in a military context.

Results revealed general support for the hypotheses. As a consequence of the 3-week intervention, the experimental group engaged in a significantly greater use of goal-setting, relaxation techniques, self-talk strategies and imagery/mental rehearsal in training than the control group, there was a significant increase in observer-rated mental toughness in the experimental group between pre and post-test, whilst there was no change in mental toughness in the control group. Moreover, individual performance was significantly higher in the experimental group during P-Company when controlling for fitness and leadership climate in training. However, significant differences in psychological skills usage during P-Company were only evidenced with relaxation and imagery, whereas no differences were evidenced in the use of goal-setting and self-talk. Lastly, whilst the experiential group had higher overall pass rates during P-Company, the difference was not significant.

An interesting and unanticipated result that emerged from the current research was the difference for the intervention effects on psychological skill usage during training and during P-Company. Specifically, use of all the psychological skills was impacted during training whilst only relaxation and imagery were impacted during P-Company. It is unclear why exactly this was the case, however, a closer examination of the nature of the psychological skills, the nature of the P-Company assessment, and the environment in which the research was conducted may provide some possible explanations. On P-Company, the control recruits reported using the same levels of self-talk and goal setting, yet they had not received any training in the use of these skills. A possible explanation is that goal setting and self-talk may be more naturally occurring psychological strategies than relaxation and imagery. Due to the consequences of failing P-Company, optimal performance on every event is arguably more important and, therefore, stressful than training. Indeed, previous research has shown athletes to engage in greater use of psychological skills during competition than in practice because athletes view competition as more important than practice (e.g., Frey, Laguna, & Ravizza, 2003; Thomas et al., 1999). Consequently, the control group may have naturally employed goal setting and self-talk strategies during P-Company and not in training, but without having been taught how to successfully make use of relaxation and imagery strategies and given the opportunity to practice them, were unable to employ them as effectively during P-Company. Indeed, one of the major limitations of the TOPS-2 is that it only measures use of psychological skills, not ability or effectiveness.

Therefore, the effectiveness of imagery use between the groups during competition may be due to the quality of imagery and/or type of imagery employed. Researchers have identified different types of imagery, all of which serve a different purpose during a performance task (Cummings & Ramsey, 2009). The use of two types of imagery in particular may have influenced the results in the current study. Cognitive general imagery refers to the

imagery of strategies, routines, and game plans (e.g., mental rehearsal), while motivational general- arousal imagery is related to the arousal and anxiety associated with competition and has been used by athletes to remain calm and relaxed prior to competition (Munroe, Giacobbi, Hall, & Weinberg, 2000). The experimental group were educated in the different types of imagery and their purpose and, therefore, may have employed the appropriate types of imagery more than the control group. However, the TOPS-2 imagery scale measures only the use of imagery and does not assess the functions of imagery. Consequently, it is unclear which types of imagery were employed.

Although it is unclear how each of these skills directly impacted on the recruits' performance during P-Company, as a consequence of the PST, the recruits' ability to recognize and regulate arousal levels and reduce the debilitating effects of anxiety is likely to have been a key factor in achieving optimal performance (e.g., Hardy et al., 1996; Krane & Williams, 2011). It is also likely that the recruits in the experimental group were able to use relaxation techniques to reduce pre-performance anxiety prior to each event and regulate arousal levels in order to cope with the extreme physical effort experienced on P-Company (Kress & Statler, 2003; Thelwell & Greenlees, 2001). We did not measure anxiety or arousal levels in recruits so we cannot be sure of this, however, future research may be warranted to explore this intriguing possibility. The current intervention included all the psychological skills in one package but the results from the reported use of psychological skills during competition may point towards the notion that imagery and relaxation may be more important skills in this context. However, the data only tentatively suggest this and future research exploring which specific psychological skills impact performance and mental toughness in this context is warranted.

Several limitations are acknowledged in this study, the first of which was the necessity to adopt a random block design. While complete random allocation of participants is

preferred, for the reasons explained in the study design section, this was not possible. Potentially, the study could also have been influenced by Hawthorne effects (Gillespie, 1991). Whilst having a control group is a major strength of the current research providing a placebo condition as well would have been an additional strength. This, however, was not possible within the constraints of training program of the organization. While steps were taken to minimize any such effects or leakage from the intervention group, we cannot rule out Hawthorne effects entirely. Whilst the most parsimonious explanation of the results remains that the psychological skills intervention significantly increased psychological usage, mental toughness and performance, we cannot completely rule out any such Hawthorne effects. Furthermore, cross contamination between groups cannot be completely ruled out. However, the training was delivered to intact training platoons that start training approximately five weeks apart. Therefore, we believe that the minimal interaction recruits from each group would have had with each other would have minimal impact on the results.

It is evident that some of the effect sizes are small. One possible explanation for this is that observational field studies tend to yield deflated effect sizes due to the interaction test relying on observations in the corners of the design. However, these observations tend to be uncommon in field studies, particularly with correlated variables (e.g., goal-setting, relaxation, self-talk and imagery) (McClelland & Judd, 1993).

The TOPS-2 as an instrument which to measure psychological skills usage in a military context has its limitations. The TOPS-2 was developed specifically for the sport setting, thus whilst the measure does appear to possess adequate utility in a military context, further validation work may be required to adapt the TOPS to the military. Indeed, given the recent interest in psychological skill usage in the military, the development of a new military specific measure may even be warranted. Although the short-term effects of the intervention were promising, the long-term effects remain unknown. Future research should seek to

measure the continued effects on performance, perhaps even in the operational context, for soldiers who have been exposed to psychological skills training early in the training cycle. Further, future research should seek to identify whether the increased levels of mental toughness derived from the PST are maintained over time.

Despite the limitations of this study, we believe that it has a number of key strengths. The primary strength of the study is that it was conducted within a live elite military training setting in which performance under pressure held real consequences for success and failure, using an informant rating of mentally tough behavior and an ecologically valid measure of performance. Furthermore, the study considerably extends the literature by being the first study to control for individual fitness and leadership climate in the context of a psychological skills training intervention. The findings lend support to previous studies advocating the use of traditional psychological skills training packages in facilitating the development of mental toughness (e.g., Bell et al., 2013; Crust & Azadi, 2010; Gucciardi et al, 2009; Kaiseler et al., 2009) and previous studies that have shown PST to be a useful performance enhancing strategy in a military training setting (e.g., Adler et al., 2015; DeWiggins et al., 2010; Hammermeister, et al., 2010). At a more general level, the findings reinforce the general consensus that theoretical, empirical and applied concepts in sport psychology can be successfully applied in a military context (e.g., Fiore & Salas, 2008, Goodwin, 2008; Hammermeister, et al., 2010).

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Table 1. *Descriptive data for dependent variables and covariates across both study conditions N=173*

	Experimental Group						**Control Group**					
	Week 16		Week 20		P-Company		Week 16		Week 20		P-Company	
Variable	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)	Mean	(SD)
Instructor-rated Mental Toughness	4.89	(1.15)	5.10	(1.09)			4.68	(1.06)	4.58	(1.11)		
Goal-setting	3.45	(0.70)	4.00	(0.5)	3.86	(0.59)	3.38	(0.78)	3.44	(0.74)	3.68	(0.87)
Relaxation	1.82	(0.92)	2.60	(1.01)	2.77	(0.95)	1.58	(0.76)	1.65	(0.7)	2.26	(0.95)
Self-talk	3.74	(0.70)	4.11	(0.7)	3.75	(0.64)	3.70	(0.75	3.66	(0.88)	3.57	(0.73)
Imagery	3.00	(0.79)	3.30	(0.73)	3.5	(0.61)	2.89	(0.68)	3.00	(0.85)	3.25	(0.84)
Mean Fitness score (min/s)	19.06	-(1.17)	18:49	(01:10)			20:13	(01:46)	19:20	(01:11)		
Standardized Fitness score	0.35	(0.78)	0.224	(0.97)			-3.23	(1.07)	-2.07	(0.99)		
Composite Transformational Leadership	4.13	(0.64)	4.06	(0.63)			4.09	(0.64)	4.02	(0.70)		
P-Company Performance					56.07	(-9.6)					55.02	12.21